

INFORMATION RETRIEVAL/DISTRIBUTION SYSTEM, COMPUTER
READABLE STORAGE MEDIUM, AND PROGRAM FOR INFORMATION
RETRIEVAL/DISTRIBUTION

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BACKGROUND OF THE INVENTION

1. Field of the Invention

10 The present invention relates to an information
retrieval/distribution system, a computer readable
storage medium, and a program for information
retrieval/distribution, which are configured on computers
such as personal computers and used for retrieving
various kinds of information such as fact data which are
scattered on a network such as the Internet and for
15 distributing the information to users, etc.

2. Description of the Related Art

20 In general, in research or development
workplaces, several kinds of information, for example,
fact data such as waveform data from seismometers and
genetic information, which have been collected through
researcher's experiment, etc., are stored in respective
databases and are used by other experts.

25 In recent years, we have had much opportunity,
because of the widespread use of the Internet, in which
the data stored in databases are retrieved by users and
distributed to the users through the Internet. Users
empirically know the location of a database necessary for
themselves, and conventionally obtain the necessary data
(information) by sending e-mail to the database
30 administrator of the database, or receiving a data
distribution service on the basis of the URL (Uniform
Resource Locator) indicating the address of the database,
etc.

35 In more detail, the conventional information
retrieval/distribution system for obtaining necessary
data through the Internet is usually configured so that
personal computers possessed by users, database servers

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for providing a plurality of databases, and personal computers for database servers for giving several kinds of instructions to the database servers, are connected to the Internet

5 In this information retrieval/distribution system, users, as information retrieval request sources, know empirically the location of the database having the data necessary, and request the personal computers for the database servers through the user's personal
10 computers to offer the database to the users. The user then allows a browser to display the data in the database which has been offered from the personal computer for the database servers, on the input screen of the user's personal computer, and retrieves the necessary data. When
15 the necessary data is in the database, the user obtains the data through the personal computer for the database servers.

 However, there is a problem, in the conventional information retrieval/distribution system
20 described above, in that it is difficult for users to know the location of every database, through the Internet, in which the necessary data are stored, because these data can be scattered all over the world, in many cases. We have another problem in that it is also
25 difficult for experts to use these data, because the formats of these data are not unified, in many cases.

 Furthermore, although the data in the field of expertise can be obtained through an institute, etc., it is even difficult to know whether the data exists or not
30 when retrieving the data outside the field of expertise, Even if a typical information retrieval tool, such as a search engine, on the Internet is used, a number of sites on the Internet have to be searched, which puts a large burden to the users.

35 On the other hand, it is also difficult to know the ever-increasing locations of databases (database sites) on the Internet. For this reason, locations of

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databases are often disclosed through e-mail or homepages at present, and hence users always have to monitor the information about the database sites necessary for the users.

5 SUMMARY OF THE PRESENT INVENTION

It is therefore an object of the present invention to provide an information retrieval/distribution system, a computer readable storage medium, or a program for information retrieval/distribution, by which users can
10 retrieve and collect data, on a network such as the Internet, to use the necessary data efficiently even if the users do not know the locations of the data on the network or the formats of the data are not unified.

In order to achieve the above object, a information
15 retrieval/distribution system according to the present invention comprises an information retrieval request unit for requesting the retrieval of several kinds of information which are scattered on a network; and a plurality of database management units (e.g., managers)
20 for managing databases in which said several kinds of information are stored. Each of said plurality of database management units (e.g., each manager) has management information (e.g., manager information) about the databases which are managed by said each manager, and
25 has management information about the data bases which are managed by other database management units which can be connected to said each manager through said network.

In such a system configuration, when a retrieval
30 criterion is input to said information retrieval request unit, one of said plurality of database management units (e.g., one manager), based on said management information in said one manager, retrieves the information in the databases managed by said one manager, and requests any other database management unit (e.g., other manager)
35 managing the database in which the information related to said retrieval criterion is stored to retrieve the information in the database managed by said other

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manager, thereby distributing the information corresponding to said retrieval criterion to the information retrieval request source.

5 Preferably, said one manager manages a plurality of databases and can register the kinds of said plurality of databases as management information, and when the information retrieval is requested by said information retrieval request source, said one manager retrieves said plurality of databases to collect the required
10 information, and then changes the data format of the collected information to a unified format and distributes the collected information to said information retrieval request source.

15 Furthermore, preferably, said one manager has the function of requesting said other manager to retrieve the information in the databases managed by said other manager followed by receiving the result of the retrieval of said information from said other manager to distribute said result to said information retrieval request source.

20 Furthermore, preferably, said one manager has the functions of including the list of the management information possessed by said other manager in the management information of said one manager; comparing the management information of the database management unit
25 which has been newly requested to retrieve the required information by said one manager with the management information of said one manager to obtain the difference between said both management information; and updating the management information of said one manager, based on
30 said difference, or said one manager has the function of communicating with said other manager periodically and exchanging the management information with said other manager to update the management information of said one manager.

35 Furthermore, preferably, said one manager has the functions of making category information which defines the categories of the databases managed by said one

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manager; and designating a database management unit managing the database in the same category to exchange the information with said database management unit, based on said category information.

5 Furthermore, preferably, said one manager has the functions of designating retrieving items of the information in the databases managed by said one manager through the retrieving screen of said information retrieval request unit; and requesting said other manager
10 to retrieve the information in the databases managed by said other manager.

15 Furthermore, preferably, said one manager has the function of automatically requesting said other manager managing the database in which the information related to said retrieval criterion is stored, to retrieve said information, in the case in which said one manager does not designate any retrieving item through the retrieving screen of said information retrieval request unit.

20 Furthermore, preferably, said one manager has the functions of designating a category through the retrieving screen of said information retrieval request unit; and connecting said one manager automatically to said other manager managing the database in said category to select said database in said category.

25 Furthermore, preferably, said one manager has the functions of registering the retrieval information of said information retrieval request source; executing the same retrieval periodically, based on said retrieval information; and sending the result of the retrieval to
30 said information retrieval request source.

35 In addition, an information retrieval/distribution system according to the present invention may be accomplished by using a computer readable storage medium that stores a means which retrieves the information in the database managed by one of database management units (one manager), based on the management information in said one manager, when a retrieval criterion is input to

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an information retrieval request unit for requesting the retrieval of several kinds of information which are scattered on a network; and a means which requests another database management unit (other manager) which is able to be connected to said one manager, through said network, to retrieve the information in the database in which the information related to said retrieval criterion is stored and which is managed by said other manager, based on the management information about the database managed by said other manager.

Furthermore, an information retrieval/distribution system according to the present invention may be accomplished by using a program for information retrieval/distribution allowing a computer, in order to retrieve information and distribute said information to the information retrieval request source, to operate as a means which retrieves the information in the databases managed by one of database management units (one manager), based on the management information in said one manager, when a retrieval criterion is input to an information retrieval request unit for requesting the retrieval of several kinds of information which are scattered on a network; and a means which requests another database management unit (other manager) which is able to be connected to said one manager, through said network, to retrieve the information in the database in which the information related to said retrieval criterion is stored and which is managed by said other manager, based on the management information about the database which is managed by said other manager.

In summary, in the present invention, database management units such as an information retrieval request unit and managers having user interface function are provided on the Internet, and each of the database management units (each manager) has management information about databases managed by said each manager and management information about the databases managed by

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other database management units in remote sites which can be connected to said each manager through the Internet. Therefore, a user may only request a database management unit to retrieve the database necessary for the user through the retrieving screen of the information retrieval request unit, so that said database management unit requests any other database management unit in a remote site which manages a necessary database, based on the management information mentioned above, to retrieve the required information, and collects the required information, and then distributes the necessary information to the user. For this reason, it is not necessary for the user to check on information about the location of the data every time the user wants to get the data, and thereby the user can get necessary data efficiently.

In addition, in the present invention, since the database management unit has the function of converting information from the database into the information in a unified data format, it is not necessary for the user to convert the format of the distributed data every time the user gets it, and thereby the user can use necessary data easily.

BRIEF DESCRIPTION OF THE DRAWINGS

The above object and features of the present invention will be more apparent from the following description of preferred embodiments with reference to the accompanying drawings, wherein:

Fig.1 shows the configuration of a conventional information retrieval/distribution system;

Fig.2 is a block diagram (1) showing the configuration of an embodiment of an information retrieval/distribution system according to the present invention;

Fig.3 is a block diagram (2) showing the configuration of an embodiment of the information retrieval/distribution system according to the present

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invention;

Fig.4 is a block diagram showing the flow of the information retrieval procedure in another embodiment of the present invention;

5 Fig.5 shows a data format depicting an example of manager information used in the embodiments of the present invention;

10 Fig.6 is a flow chart (1) depicting the procedure of a typical information retrieval in the embodiments of the present invention;

Fig.7 is a flow chart (2) depicting the procedure of the typical information retrieval in the embodiments of the present invention;

15 Fig.8 is a flow chart depicting the procedure of the information retrieval in the case in which a manager is designated in the embodiments of the present invention;

20 Fig.9 is a flow chart depicting the procedure of the information retrieval in the case in which a particular category is designated in the embodiments of the present invention;

Fig.10 is a flow chart (1) depicting the procedure of a periodical information retrieval in the embodiments of the present invention; and

25 Fig.11 is a flow chart (2) depicting the procedure of a periodical information retrieval in the embodiments of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

30 Before the preferred embodiments of the present invention are described, conventional arts and problems thereof are described briefly with reference to the reference figure (Fig.1).

35 Fig.1 shows the configuration of a conventional information retrieval/distribution system. In Fig.1, a simplified configuration of the information retrieval/distribution system using the Internet 100 is shown.

In the information retrieval/distribution system

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shown in Fig.1, a user's personal computer (shown as
USER'S PC in Fig.1) 20 which is owned by a user U,
database servers (shown as DB SERVER in Fig.1) 140-1 and
140-2 which provide databases (shown as DB in Fig.1) 130-
1 and 130-2, respectively, and a personal computer for
database servers (personal computer for DB servers) 110
which gives various kinds of instructions to the database
servers 140-1 and 140-2 are connected to the Internet
100.

In the information retrieval/distribution system
configured as shown in Fig.1, the user U, an information
retrieval request source, knows empirically the location
of the database (e.g., database 130-1) having the data
necessary for the user, and requests the personal
computer for the database server 110 through the user's
personal computer 20 to offer the database 130-1 to the
user U. The user U then allows software of a browser 21
to display the data in the database which has been
offered from the personal computer for the database
server 110, on the input screen of the user's personal
computer 20, and retrieves the necessary data. When the
necessary data is in the databases, the user U obtains
the data through the personal computer for the database
server 110.

However, as aforementioned, there is a problem, in
the conventional information retrieval/distribution
system as shown in Fig.1, in that it is difficult for the
user U to know the location of every database, through
the Internet, in which the data necessary for the user U
are stored, because these data can be scattered all over
the world, in many cases. There is another problem in
that it is also difficult for experts to use these data,
because the formats of these data are not unified, in
many cases.

Next, the configuration and operation of the
preferred embodiments of the present invention which has
been contrived to solve the above problems are described

below with reference to the accompanying drawings (Fig.2 to Fig.11). Described below are the specific configuration and information retrieval procedure of the information retrieval/distribution system having a plurality of information retrieval/distribution apparatuses which are connected to the Internet and can refer to each other.

Fig.2 and Fig.3 are block diagrams (1) and (2) respectively showing the configuration of an embodiment of the information/distribution system according to the present invention. Hereinafter, any component similar to an aforementioned component is indicated with the same reference numeral.

In the information retrieval/distribution system shown in Fig.2 and Fig.3, a first manager 30-1 and a second manager 30-2 are connected through the Internet. These managers correspond to the plurality of database management units in the present invention. The first manager 30-1, a plurality of first database servers (shown as FIRST DB SERVER in the figures) 40-1 to 40-n (n is a positive integer equal to 2 or more than 2) which are connected to the first manager 30-1, and a personal computer for the first manager (PC for the first manager) 10-1 which controls the operation of the first manager 30-1, comprise a first information retrieval/distribution apparatus on the Internet 10. In the first information retrieval/distribution apparatus, a plurality of databases 50-1 to 50-n in which several kinds of data are stored are connected to the plurality of first database servers 40-1 to 40-n, respectively. The data in these databases are offered according to the instruction of the first manager 30-1. Likewise, the second manager 30-2, the second database server (shown as SECOND DB SERVER in Fig.2) 42-1 which is connected to the second manager 30-2, and a personal computer for the second manager (PC for the second manager) 10-2 which controls the operation of the second manager 30-2, comprise a second information

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request unit 34-1 which request a remote site manager (e.g., the second manager 30-2) to retrieve the related data.

The manager information 33-1 includes the manager information about the database 52-1 managed by a remote site manager (e.g., the second manager 30-2) which can be connected to the first manager 30-1 through the Internet, in addition to the manager information about the databases 50-1 to 50-n managed by the first manager 30-1.

In the information retrieval/distribution system shown in Fig.2 and Fig.3, when the user U requests the retrieval of data necessary for the user U through the retrieval screen 32-1, the information reference/retrieval unit 31-1 in the first manager 30-1 refers to the manager information 33-1 and retrieves the data in the databases 50-1 to 50-n managed by the first manager 30-1. If the information reference/retrieval unit 31-1 has not obtained the required data as the result of the retrieval, the information reference/retrieval unit 31-1 requests the remote second manager 30-2 managing the database (e.g., the database 52-1) in which the related data is stored, to retrieve the database 52-1 managed by the second manager 30-2. Thus, even if the user does not know whether or not the database managed by the second manager in a remote site exists, the user can use necessary data efficiently by retrieving and collecting the information in the database at the remote site. The information reference/retrieval unit 31-1, the remote site information retrieval request unit 34-1, and the manager information updating unit 35-1 in the first manager are preferably implemented via software of the computer.

In the case in which an embodiment of the information retrieval/distribution system according to the present invention is implemented by using a computer readable storage medium, such as a hard disk and a magneto-optical disk, it is preferred to provide a

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computer readable storage medium that stores a means
(e.g., the information reference/retrieval unit 31-1)
which retrieves the data in the database managed by the
first manager, based on the management information in the
5 first manager, when a retrieval criterion is input to an
information retrieval request unit for requesting the
retrieval of several kinds of information which are
scattered on a network; and a means (e.g., the remote
site information retrieval request unit 34-1) which
10 requests a remote manager (e.g., the second manager)
which is able to be connected to the first manager
through the Internet, to retrieve the information in the
database in which the information related to said
retrieval criterion is stored and which is managed by the
15 second manager, based on the management information about
the database managed by the second manager.

It is also preferred to provide a program for
information retrieval/distribution allowing a computer,
in order to retrieve information and distribute said
20 information to the information retrieval request source,
to operate as a means which retrieves the information in
the database managed by one of database management units
(one manager) (e.g., the first manager), based on the
management information (e.g., the manager information) in
25 said one manager, when a retrieval criterion is input to
the information retrieval request unit for requesting the
retrieval of several kinds of information which are
scattered on a network such as the Internet; and a means
which requests another database management unit (other
30 manager) (e.g., the second manager) which can be
connected to said one manager, through the network, to
retrieve the information in the database in which the
information related to said retrieval criterion is stored
and which is managed by said other manager, based on the
35 management information about the database which is
managed by said other manager.

In addition, it is also preferred that the manager

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information updating unit 35-1 in the first manager 30-1 has the functions of including the list of the manager information possessed by other managers in the management information of the first manager 30-1; comparing the manager information of the second manager which has been newly requested to retrieve the required information by the first manager with the manager information of the first manager to obtain the difference between said both manager information; and updating the manager information of the first manager, based on said difference; or the function of communicating with the second manager periodically and exchanging the manager information with the second manager to update the manager information of the first manager. In this invention, it is preferred to provide a storage medium in which a means for implementing the above functions is stored

Fig.4 is a block diagram showing the flow of the information retrieval procedure in another embodiment of the present invention. In this figure, the configuration of the information retrieval/distribution system is simplified more than the aforementioned embodiment shown in Fig.2 and Fig.3.

The configuration of the embodiment shown in Fig.4 is substantially the same as the configuration of the embodiment shown in Fig.2 and Fig.3, except that the second manager 30-2 of the second information retrieval/distribution apparatus manages the plurality of databases 52-1 to 52-3 and that the third information retrieval/distribution apparatus is connected to the Internet, in addition to the first and second information retrieval/distribution apparatuses.

As shown in Fig.4, the third information retrieval/distribution apparatus comprises, like the aforementioned first and second information retrieval/distribution apparatuses, a third manager 30-3, a third database server (not shown in Fig.4) which is connected to the third manager 30-3, and a personal

In the information retrieval/distribution system in Fig.4, when retrieving the data necessary for the user U, the user U at first connects the user's personal computer to the first manager 30-1 through the Internet, and then puts the retrieval screen 32-1 (shown in Fig.3) in display on the input screen of the user's personal computer using the browser 21 (shown in Fig.2). Next, the user U inputs a retrieval criterion to the retrieval screen 32-1 by means of the input operation button, etc. to allow the first manager 30-1 to retrieve the necessary data. The first manager 30-1 refers to the manager information 33-1. When the first manager 30-1 has recognized that the required data exists in the databases 50-1 to 50-3 managed by the first manager 30-1, the first manager 30-1 retrieves the required data. When the first manager 30-1 has obtained the required data as the result of the retrieval, the first manager 30-1 converts the required data into an appropriate data format and then sends the data to the user U. When the first manager 30-1 has not obtained the required data, the first manager 30-1 refers to the manager information 33-1 and then selects the second manager 30-2 managing the database in which the data in the same category as the required data is stored, from the managers which can be connected to the first manager 30-1, and requests the second manager 30-2 to retrieve the required data, through the Internet. The second manager 30-2 which has been requested to retrieve the required data retrieves the data in the databases 52-1 to 52-3 managed by itself. When the second manager 30-2 has obtained the required data, the second manager 30-2 converts the required data into an appropriate data format, and then send the data to the first manager.

When the first manager 30-1 requests the second manager 30-2 to retrieve the data, the first manager 30-1

sends the latest renewal date of the manager information 33-1 of the first manager 30-1. If the manager information 33-2 of the second manager 30-2 is newer than the manager information 33-1 of the first manager 30-1, the second manager 30-2 sends its manager information 33-2 to the first manager 30-1.

For example, in the information retrieval/distribution system in Fig.4, the second manager 30-2 has the manager information 33-3 of the third manager 30-3, but the first manager 30-1 does not have the manager information 33-3 of the third manager 30-3. In this case, the first manager 30-1 learns the existence of the third manager 30-3 from the manager information 33-2 which has been sent by the second manager 30-2.

As described above, the user may only connect the user's personal computer to a manager (e.g., the first manager) known by the user so that the user also retrieve the information in the database managed by any other manager (e.g., the third manager). However, the user may intentionally request only any other manager (e.g., the third manager) to retrieve the data by designating it through the retrieval screen. For this reason, the user may retrieve the database managed by a manger (e.g., the second manager) at a remote site by using a retrieval screen, which the user is accustomed to use, of a manager (e.g., the second manager) to which the user's personal computer is usually connected.

Furthermore, the first manager, which is usually used by the user, has the functions of making category information which defines the categories of the databases managed by the first manager; and designating a manager managing the database in the same category to exchange the information with said manager based on said category information. In this case, when the user does not particularly designate any manager to be connected to the first manager, the first manager retrieves its manager

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As shown in the flow chart in Fig.6, a user, who is a information retrieval request source, at first connects a user's personal computer to the nearest data center (e.g., the first data center), and then allows the user's personal computer to display the retrieval screen (step S10). Next, the user inputs a retrieval criterion, such as the user's original retrieval method, retrieval frequency and the like, into the retrieval screen to request the retrieval of the data necessary for the user (step S11).

The manager in the first data center requests the database servers managed by itself to retrieve the required data (step S12). In addition, the manager in the first data center refers to the manager information stored in itself, and requests any other manager (other manager) in any other data center (other data center) which manages the databases in which the data in the same category as the required data is stored, to retrieve the required data, and at the same time sends the manager information stored in itself to said other manager (step 13). Further, the manager in the first data center receives the result of the retrieval from a database server managed by itself (step S14). When the manager in the first data center has received a good result of the retrieval (required data) (step S15), the manager converts the required data into an appropriate unified data format (step S16).

On the other hand, said other manager in said other data center requests the database servers managed by itself to retrieve the necessary data according to the request of data retrieval from the manager in the first data center (step S20). Further, said other manager receives the result of the retrieval from database servers managed by itself (step S21). When said other manager has received a good result of the retrieval (required data) (step S22), said other manager converts the required data into an appropriate unified data format

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(step S23).

After that, as shown in the steps S24 and S25 in Fig.7, said other manager in said other data center sends the data after the conversion as well as its manager information to the manager which has requested the data retrieval.

Further, the manager in the first data center displays the result of the retrieval in the steps S15 and S22 on the input screen of the user's personal computer (steps S17 and S18). Finally, the manager in the first data center compares the date of the manager information of the manager from which the required data has been sent with the date of its manager information, and consequently updates its manager information (step S19).

Said other manager in said other data center, after sending the manager information of the manager from which the required data has been sent to the manager of the request source, also compares the date of the manager information of the manager from which the required data has been sent with the date of its manager information, and consequently updates its manager information (step S26).

Fig.8 is a flow chart depicting the procedure of the information retrieval in the case in which a particular manager is designated in the embodiments of the present invention. In Fig.8, shown is the process flow of the data retrieval in the case in which a particular manager is designated in the information retrieval/distribution system which also comprises a first information retrieval/distribution apparatus consisting of a first data center and other information retrieval/distribution apparatuses each consisting of any other data center.

As shown in the flow chart in Fig.8, a user at first connects a user's personal computer to the nearest data center (e.g., the first data center), and then allows the personal computer to display the retrieval screen (step S30). Next, the user designates a manager other than the

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manager in the first data center (step S31).

5 The data center which includes the manager
designated by the user connects the manager in the data
center to the user's personal computer (step S32), and
then allows the user's personal computer to display the
retrieval screen (step S33). Consequently, the retrieval
screen in the data center is displayed on the input
screen of the user's personal computer (step S34), and
then the process goes to the aforementioned step S10 in
10 Fig.6 and the ordinal data retrieval is executed.

Fig.9 is a flow chart depicting the procedure of the
information retrieval in the case in which a particular
category is designated in the embodiments of the present
invention. Also in Fig.9, shown is the process flow of
15 the data retrieval in the case in which that a particular
category is designated in the information
retrieval/distribution system which also comprises a
first information retrieval/distribution apparatus
consisting of a first data center and other information
retrieval/distribution apparatuses each consisting of any
20 other data center.

As shown in the flow chart in Fig.9, a user at first
connects a user's personal computer to the nearest data
center (e.g., the first data center), and then allows the
personal computer to display the retrieval screen (step
25 S40). Next, the user designates a category on this
retrieval screen (step S41).

The manager in the first center refers to its
manager information and retrieves the managers which
30 manage databases in the designated category (step S42),
and then displays the manager selection screen on which
managers in this category are described on the input
screen of the user's personal computer (steps S43 and
S44).

35 The user designates a manager on the manager
selection screen displayed on the input screen (step
S45). The data center which includes the manager which

FIG. 9

has been designated by the user connects the manager in the data center to the user's personal computer (step S46), and then allows the user's personal computer to display the retrieval screen (step S47). Consequently, the retrieval screen in the data center is displayed on the input screen of the user's personal computer (step S48), and then the process goes to the aforementioned step S10 in Fig.6 and the ordinal data retrieval is executed.

Fig.10 and Fig.11 are flow charts (1) and (2) respectively depicting the procedure of a periodical information retrieval in the embodiments of the present invention. In Fig.10 and Fig.11, shown is the process flow in the case of executing the periodical data retrieval in the information retrieval/distribution system which also comprises a first information retrieval/distribution apparatus consisting of a first data center (DC) and other information retrieval/distribution apparatuses each consisting of any other data center (DC).

As shown in the flow chart in Fig.10, the manager in the first data center at first refers to each user's retrieval criterion, and automatically requests the database servers managed by itself to retrieve the data (step S50). Next, the manager in the first data center also requests any other manager (other manager) in any other data center (other data center) which manage the databases having the data in the same category as the required data to retrieve the required data, and at the same time sends its manager information to said other manager in said other data center (step S51). Further, the manager in said first data center receives the result of retrieval from the database server managed by itself (step S52). When the manager in the first data center has received a good result of the retrieval (the required data) (step S53), the manager converts the required data into an appropriate unified data format (step S54).

On the other hand, said other manager in said other data center, which manages the database having the data in the same category as the required data, requests the database servers managed by itself to retrieve the required data according to the request of data retrieval from the manager in the first data center (step S59). Further, said other manager in said other data center receives the result of the retrieval from the database server managed by itself (step S60). When said other manager in said other data center has received a good result of the retrieval (the required data) (step S61), said other manager converts the required data into an appropriate unified data format (step S62).

After that, as shown in the steps S63 and S64 in Fig.11, said other manager in said other data center sends the data after the conversion, as well as its manager information, to the manager which has requested the data retrieval.

The manager in the first data center stores the result of the retrieval in steps S53 and S61 in the file (step S55). Further, the manager in the first data center compares the date of the manager information of the manager from which the required data has been sent with the date of its manager information, and consequently updates its manager information (step S56). Finally, the manager in the first data center sends the notification that the periodical data retrieval has completed to the user by e-mail (step S57). The user may obtain the file which has been indicated in this e-mail (step S58).

Said other manager in said other data center, after sending the manager information of the manager from which the required data has been sent, also compares the date of the manager information of the manager from which the required data has been sent with the date of its manager information, and consequently updates its manager information (step S65).

As described above, according to the preferred

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